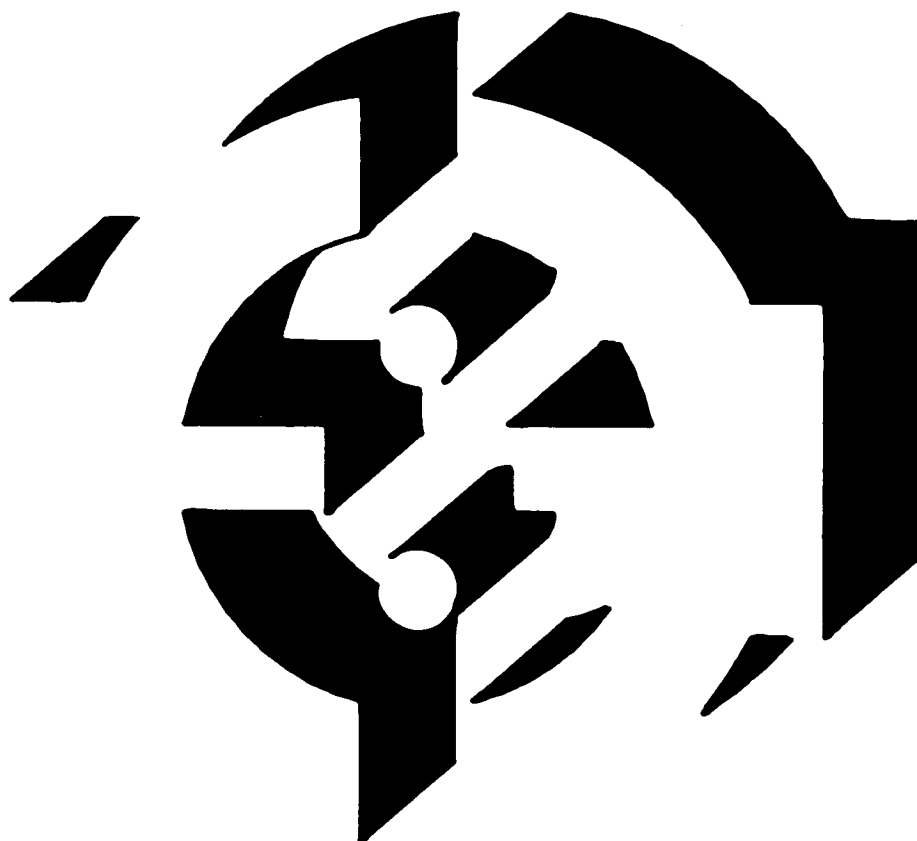


PRICE \$10.00

COUNTERPOINT SA-3000



THE OWNER'S MANUAL

THANK YOU

Judging from the stereo equipment you own, you rank among discriminating music listeners. You are probably no beginner when it comes to high fidelity equipment. Nevertheless, we ask you to read and carefully follow these instructions to insure a successful partnership between you and your new SA-3000 Preamplifier.

You now own a superb piece of high fidelity equipment. Used properly you are in for thousands of hours of musical enjoyment.

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INTRODUCTION

The Counterpoint SA-3000 is a precision engineered, highly accurate hybrid preamplification device. Some of the sophisticated design features found in the SA-3000 are:

1. The phono stage in the SA-3000 is designed with two inputs and can be configured in either high gain or low gain mode for low-coloration amplification of Moving Coil and Moving Magnet phono cartridges.
2. All voltage amplification stages (with the exception of the Moving-magnet phono input) use cathode-driven triodes for natural musicality and high linearity without any feedback.
3. All tube stages are electrically buffered to allow them to accurately amplify signal voltages with minimum distortion and maximum sonic transparency.
4. The power supplies offer what we consider to be the best performance available anywhere in terms of sonic inertness, low noise and reliable operation.
5. The SA-3000 incorporates an automatic muting circuit that will turn off the output of the preamplifier during power on or off, or in the event of a power failure in order to eliminate pops, thumps, and any possible damage to your speakers or power amplifier.
6. Internal provisions have been made for loading MC phono cartridges.
7. All unselected inputs are internally muted to prevent bleedthrough of undesired signals as well as reduce susceptibility to external electrical interference.
8. With the exception of the High-Voltage supply, the SA-3000 remains "powered-up." This vastly lengthens tube life by reducing the number of thermal cycles applied to the tubes.

The SA-3000 uses the same quality of passive components as found in the most expensive Counterpoint products, including German Roderstein 1% metal-film resistors and film capacitors by TRT. Very conservative design as well as careful testing and burn-in assure reliable operation, year after year.

Once you have enjoyed the outstanding performance of the SA-3000, you will understand why Counterpoint has earned the reputation of continually striving for sonic perfection. This preamplifier is intended to offer you years of fine music reproduction and will be a valued part of your home stereo system.

INSTALLING THE TUBES, THE FIRST STEP

NEVER ATTEMPT TO OPERATE THE SA-3000 IN THE "READY" MODE WITHOUT TUBES!

Installing the tubes in to the SA-3000 is a four-part process:

1. Removing the top cover from the SA-3000,
2. Taking the tubes out of their shipping boxes and inspecting them for shipping damage,
3. Installing each tube into its correct socket in the SA-3000, and
4. Re-installing the top cover.

Step 1. Removal of your SA-3000's Top Cover.

Before you can install the tubes, the top cover of your SA-3000 will need to come off. Be certain that the SA-3000 is not connected to any AC outlet then use a screwdriver to remove all 18 screws. The cover can be lifted off.

Step 2. Inspection of the first Tube.

For shipping, the tubes are located on the underside of the top cover. The following tubes have been included with your SA-3000:

- Three 6DJ8 tubes in boxes marked V1, V2 and V3.
- One 6CA4 tube in a box marked V4.

Start by removing tube V1 from its box and look at it. The appearance of a white powdery coating inside the glass indicates that the bottle is broken. Do not use this tube. Contact your Counterpoint dealer for another. Check that the pins on the bottom of the tube are straight.

Step 3. Installing the first Tube.

Refer to the diagram on the next page to locate where tube V1 goes and carefully install it into its socket. If it does not fit easily, re-check your alignment and check that you have not bent one of the pins on the tube. Use caution in installing the tubes, as there is only one correct way that a tube will fit into the socket. Repeat this process for the other three tubes.

Step 4. Setting the Phono Input Selector Switches.

While the top cover is off, set the two internal PHONO INPUT SELECT switches in accordance with the type of phono cartridge you are using. See the diagram on the next page. For more information see "*Phono Input Selection*" in the "*Internal Adjustments*" section of this manual.

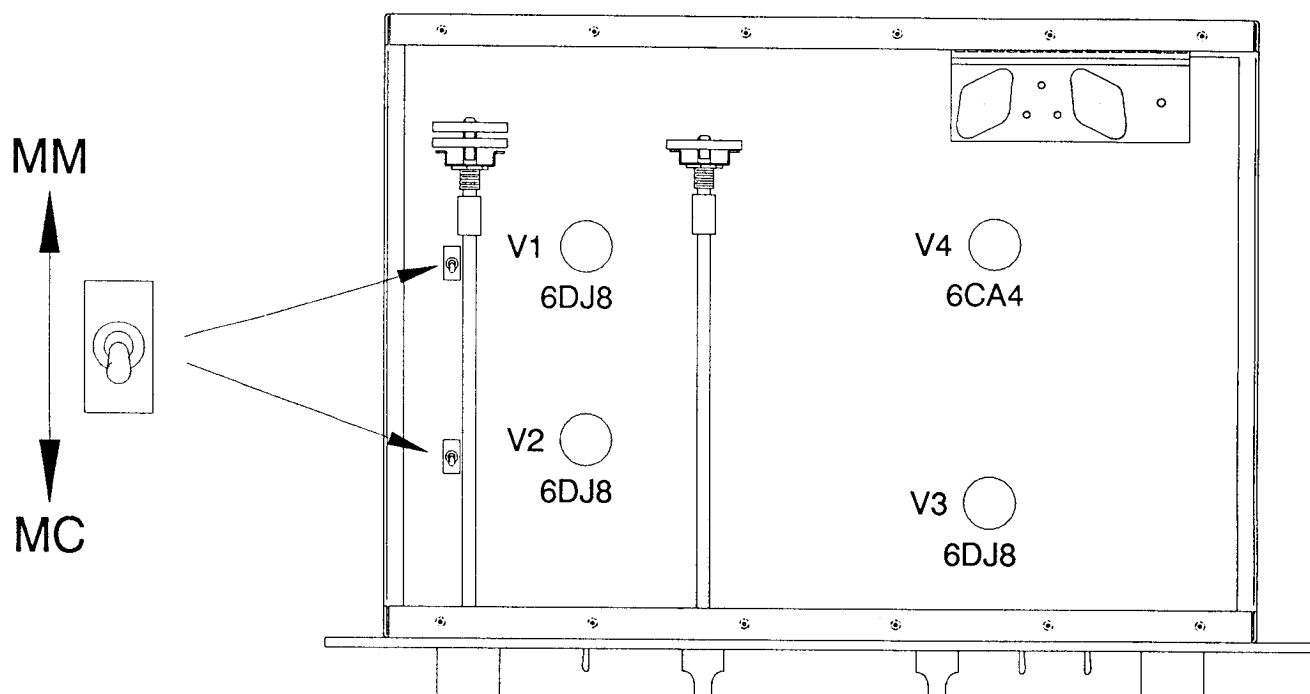


Figure. Location of Tubes and Internal Phono Input Selector Switches. If you are using a phono cartridge with an output level of 1mV or less, set both switches to the front ("MC") position. Cartridges with outputs greater than 1mV should be used with the switches set to the rear ("MM") position. Never attempt to operate the SA-3000 in the "ready" mode without tubes!

Step 5. Closing the Top Cover.

After you've installed all the tubes you should replace the top cover before attempting to use the SA-3000.

GETTING YOUR "SA-3000 ON THE AIR" QUICKLY

Step 1.

After unpacking the SA-3000, you should save all the packing materials. They are essential for shipping purposes should updating, repair or resale be desired. If you have no room for storage at your residence, then store the shipping box at a friend's house or, alternatively, cover it with floral contact paper to make an attractive end table or firkin.

Step 2.

Install the tubes. See *"Installing the Tubes, the First Step."*

NEVER ATTEMPT TO OPERATE THE SA-3000 IN THE "READY" MODE WITHOUT TUBES!

Step 3.

While the top cover is off, set the two internal PHONO INPUT SELECT switches in accordance with the type of phono cartridge you are using. For more information see *"Phono Input Selection"* in the *"Internal Adjustments"* section of this manual.

Step 4.

Place the SA-3000 as near to the final installation position as possible (See *"Installing The SA-3000"* if you are planning to install it in a cabinet). Leave yourself access to its rear panel input and output connectors.

Step 5.

Check that the front panel "ready/standby" switch is in the "standby" position.

Step 6.

Insert the AC power cord of your SA-3000 firmly into a convenient wall outlet. The indicator lamp in the middle of the faceplate will illuminate RED. If the lamp does not illuminate, there may be a problem with that unit. But before you contact your dealer, please check that the AC receptacle actually has power by plugging a lamp into the receptacle (Yeah, we know this sounds dumb, but we've had calls from customers who've forgotten that the outlet was connected to a wall switch). If you are unable to find the problem, unplug the power cord and contact your Counterpoint Dealer.

Step 7.

Look into the top of the SA-3000. You should see several Green lamps lit on the circuit board. If you see any Red lamps, unplug the unit and then plug it back in again. If the problem persists, note the "LED" number of the lamp (printed on the circuit board), and unplug the unit. There is a problem with the SA-3000. Contact your Counterpoint dealer and tell him or her the "LED" number that was lit.

Step 8.

Connect your signal sources:

PHONO: If you have set the internal Phono Input Selector Switches to the "MC" position, plug your turntable connectors into the "MC phono" input connectors and leave the shorting pins in the "MM phono" inputs. Connect your turntable's ground wire to the "chassis ground" binding post. If the internal switches have been set to the "MM" position, plug your turntable connectors into the "MM phono" input connectors and leave the shorting pins in the "MC phono" inputs. Connect your turntable's ground wire to the "chassis ground" binding post.

Always insert shorting pins into whichever set of phono inputs you are not using. Failure to do so will result in noisy operation.

HIGH-LEVEL AUDIO SOURCES: Connect your high-level signal sources (CD player, tuner, etc.) to the other LINE INPUT connectors on your SA-3000's rear panel.

Step 9.

Before fussing around with the cables for your power amplifier be certain that it is OFF, then connect it to the MAIN OUT connectors on the SA-3000. Note that there are two sets of MAIN OUTS. They are connected in parallel so that more than one power amplifier may be driven by the SA-3000.

⚠ = Red Lamps which should never be lit during normal operation.

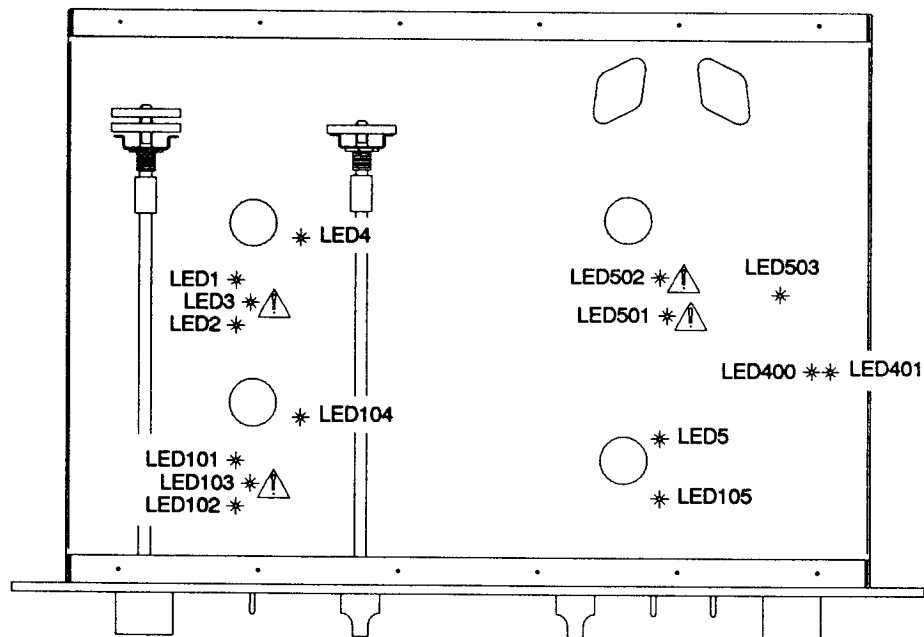


Figure. Location of the internal Diagnostic lamps. In normal operation, only the Green lamp will light. The presence of a Red lamp indicates a fault that must be corrected by your dealer. During Standby, LED503 ("I REF") is not lit.

Step 10. Turning it all on.

Double check your connections to be certain that none of them are loose. You should turn on your power amplifier at this time.

- Set the SA-3000's GAIN control to fully counter-clockwise.
- Set the TAPE 1 MONITOR knob to the SOURCE position.
- Turn on your SA-3000 Preamplifier by placing the "ready/standby" switch in the "ready" position. The front panel lamp should begin blinking yellow, indicating that the SA-3000 is warming up.
- After about 60 seconds, the lamp will stop blinking and stabilize in either a Yellow (muted) or Green (unmuted) mode.

You may now select an audio source with the "input select" control, set the "mute/operate" switch to the "operate" position and advance the "gain" knob to listen to the music. If you do not get sound, or you think something is wrong, look into the top of the SA-3000. You should see 11 green lamps lit on the circuit board. If you do not count 11 green lamps, or if you see ANY red lamps there is a problem with the unit. Note the "LED" number of any incorrect lamp (the number is printed on the circuit board). Unplug the SA-3000 and contact your dealer. Tell him or her the number of the lamp that indicated the fault.

In normal operation, only the Green lamps will light. The presence of a Red lamp indicates a fault that must be corrected by your dealer. During Standby, LED503 ("I REF") is not lit.

INSTALLING THE SA-3000

Locating Your SA-3000 And Cooling Considerations

Two important factors must be considered when selecting the location for your Counterpoint SA-3000: Sufficient clearance for ventilation and proximity to other associated products.

Cooling Considerations

If your preamplifier is to be enclosed in any sort of cabinet or rack, that enclosure should have adequate openings to insure that the preamplifier will not overheat. The feet provided on the SA-3000's bottom allow adequate clearance beneath for proper air circulation. Allow at least 2 inches of unobstructed space above the chassis to effectively dissipate sufficient heat during normal operation of SA-3000. Never block the flow of cool air to the heatsink on the rear of the SA-3000.

NOTE TO INSTALLERS: Anything that reduces the ability of heated air to vent out of the top openings or reduces the convective cooling of the rear heatsink will cause premature aging and failure of the unit. Forced-air can be used if the above requirements are kept in mind.

NEVER SUBJECT YOUR SA-3000 TO MECHANICAL JARRING OR SHOCKS WHILE IT IS PLUGGED IN!

Locating The External Transformer Box.

Locate the external transformer box well away from the SA-3000 and your turntable. The electromagnetic hum field radiated by the SA-3000's transformer can induce hum into low-level electronics.

FAMILIARIZING YOURSELF WITH THE SA-3000

Front Panel Description

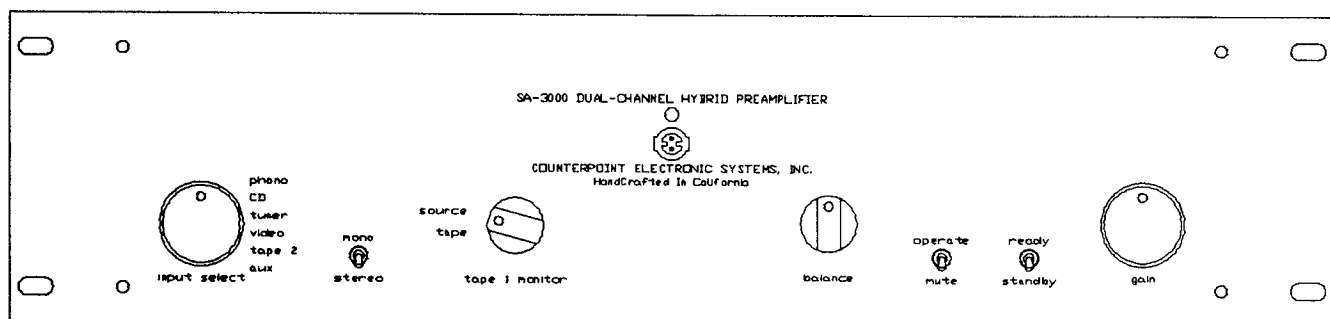


Figure. SA-3000 Front Panel.

Input Select. Use this control to select the program source to which you wish to listen. The source selected is amplified by the SA-3000's line section, after first passing through the GAIN and BALANCE controls. This control also selects the source which is sent to the TAPE OUT connectors.

Mono/Stereo. This switch bridges the two stereo channels together for monophonic reproduction of stereo signals. It may also be used when listening to old 78 rpm monophonic disc recordings to reject the out-of-phase garbage caused by a stereo phonograph cartridge.

Tape 1 Monitor. This switch performs a tape monitor function by allowing you to listen to whatever signal source is connected to the TAPE 1 Line Input connectors without disturbing the signal being fed to the TAPE OUTPUTS.

Balance. This control is used to center the stereo image.

Gain. A formal name for the volume control. Use this knob to increase or decrease the volume of the music to suit your preference.

Mute/Operate. A handy means of shutting off the signal feed to your power amplifier. It is not necessary to use this switch to prevent turn-on and turn-off thumps, as the SA-3000 handles on/off muting automatically.

Ready/Standby Switch. This switch is used to turn the High Voltage supply in the SA-3000 on and off.

Back Panel Description

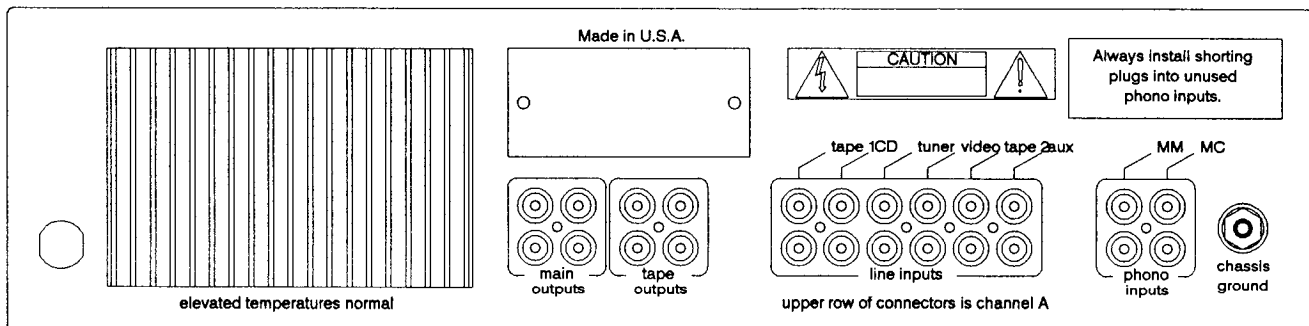


Figure. SA-3000 Rear Panel.

Chassis Ground. Attach your turntable's ground wire to this terminal.

Audio Inputs.

Phono Inputs. There are two sets of phono inputs. Selection between the two sets is performed by setting the internal Phono Input Selector Switched as described in the "Installation" section of this manual. Always keep shorting pins in the unused set or noisy operation will result. Connect your turntable to the selected set of Phono input connectors after first removing the two shorting pins from those connectors. If you are not intending to use a turntable with the SA-3000, leave all four shorting pins in the Phono Inputs to reduce the susceptibility to Radio Frequency Interference. For more information regarding which set of Phono inputs to use, see "Phono Input Selection" in the "Internal Adjustments" section of this manual.

High Level. The SA-3000 has facilities for connecting five high level ("line level") signal sources such as an FM tuner, CD player, the audio feed from your VCR, or any other high level audio sources. We have tried to anticipate the standard audio sources you are likely to have, and have labeled the connectors accordingly. However, if we missed one of your favorites (like a second CD player) you can use any of the unused line inputs as they all have the same sensitivity and frequency response. The Tape Input connectors, while primarily designed for use for monitoring a recording in progress, are also standard high level inputs and may be used with any high level audio source.

Audio Outputs.

Tape Out. These connectors are intended to be connected to the line level inputs of a tape recorder. The two sets are connected together so that two tape machines may be connected to record simultaneously.

Main Out. Connect your SA-3000 to your power amplifier using these connectors. As in the Tape Outs, the two sets of Main Outs are also connected together. This may be useful in applications such as bi-amplification where more than one stereo amplifier is used.

CONNECTING YOUR TAPE MACHINE

Step 1.

Connect the LINE LEVEL (not microphone) INPUTS of your tape recorder to either of the Tape Outputs on the rear of the SA-3000.

Step 2.

Connect your tape recorder's LINE LEVEL OUTPUTS to the Tape 1 Line Inputs on the rear of the SA-3000. Placing the Tape 1 Monitor switch in the "tape" position will allow you to hear playback of recordings. You may also use this switch to monitor recordings being made on your main ("tape 1") tape machine.

BREAK-IN AND WARM-UP PERIODS

Your new SA-3000 has already been on for over 100 hours while it was burning-in at the factory. Even so, like all high quality audio components, it will require several hours of actually playing music before it sounds its best. Each time you turn on your SA-3000, it will be ready to play music once the 60 second initializing period is over, but it has not really settled into its final, optimum, condition until at least 10 minutes has passed. This is a side effect of some very long time constants in the circuitry.

INTERNAL ADJUSTMENTS

All of the Internal Adjustments described in this section require removing the top cover of the SA-3000. *Be aware that the voltages within can be LETHAL!* Unless otherwise instructed, keep your fingers off components and the circuit board. Any adjustments made with a screwdriver should be done with one that has an insulated handle. Always unplug the SA-3000 from the AC wall outlet before removing or replacing the top cover. A screw falling onto the circuit board may cause substantial damage.

Adjustments Easily Made By Anyone

Phono Input Selection

As has been previously mentioned, the SA-3000's phono stage may be configured to either work with either MC or MM cartridges. This is performed by appropriate selection of Phono Input jacks and internal switch settings. As shipped, the SA-3000 is set to the "MC" mode, and the MC Phono Inputs may be used.

Proper determination of the best way to configure the SA-3000 is based upon the output level of the phonograph cartridge you will be using. Cartridges with outputs of 1mV or less will offer the best sound with the "MC" configuration.

The illustration on page 3 shows the location of the two internal Phono Input Selection switches. Set both switches in accordance with the Phono inputs you will be using, and insert shorting pins into the unused Phono inputs. Always unplug the SA-3000 from the AC wall outlet before changing the internal switches. Never change the switches while listening to the phono stage. The resulting "thump" can damage amplifiers and speakers.

If you are unsure of your cartridge's output level, the following guideline may be used: Phono cartridges described as "Moving-coil," or "Medium-output Moving Coil" may be used with the MC inputs of the SA-3000. Phono cartridges described as "Moving-magnet," "Moving-iron," "High-output Moving-coil" or just plain "High Output" should be used with the SA-3000 configured to "MM."

If you are still in doubt, contact the dealer from whom you purchased the cartridge and ask him or her what the darned thing is. If you guess wrong, you will not damage anything, but sound quality will suffer.

CARTRIDGE OUTPUT	INTERNAL SWITCHES	INSTALL INTO MC PHONO INPUT	INSTALL INTO MM PHONO INPUT
1mV OR LESS	MC	TURNTABLE	SHORTING PINS
MORE THAN 1mV	MM	SHORTING PINS	TURNTABLE

Figure. Location of MC LOAD sockets.

MC Cartridge Loading

Many listeners feel that the traditional 47,000 ohm input resistance used for phono inputs is too high for optimum sound when using a MC cartridge. Inside the SA-3000 are two sets of sockets into which resistors may be inserted to lower the input resistance of the MC Phono Input jacks. You will need to remove the top cover of the SA-3000 after making certain that the preamplifier is disconnected from its AC Outlet.

LETHAL VOLTAGES WITHIN! BE ABSOLUTELY CERTAIN THAT THE SA-3000 IS DISCONNECTED FROM THE WALL OUTLET.

The MC LOAD sockets are near the left edge of the circuit board. You may insert any resistor with standard 0.025 diameter leads into these sockets. The sockets are about 0.10 deep. Push the resistor leads straight into the sockets until they reach the bottom.

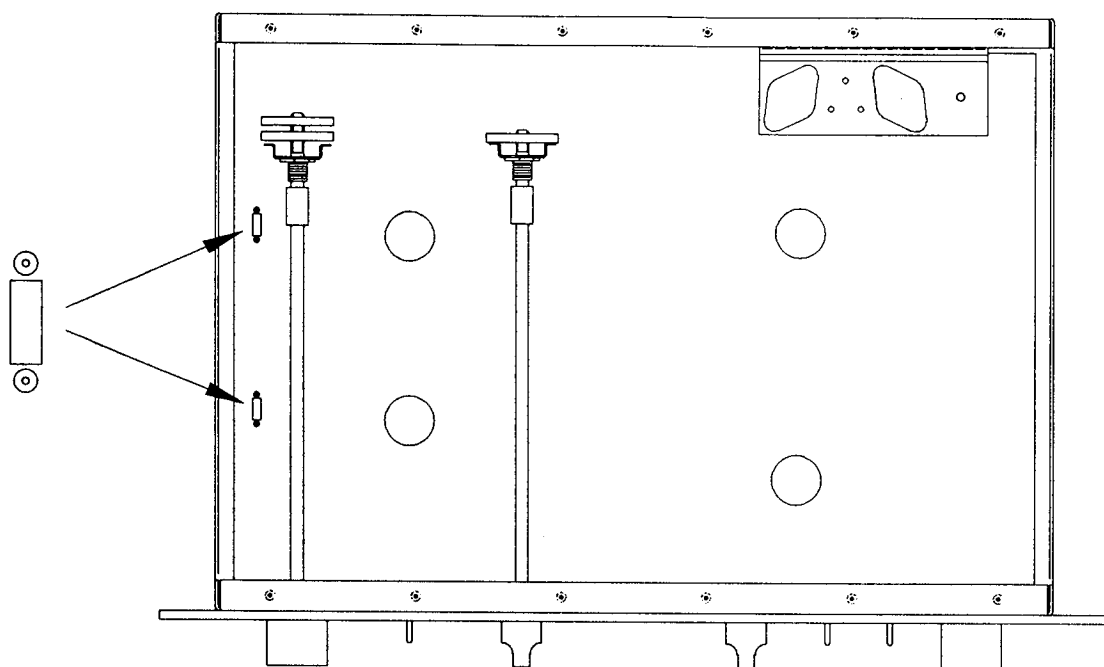


Figure. Location of MC loading jacks in the SA-3000.

PLEASE DO NOT SOLDER THE RESISTORS INTO THE SOCKETS.

The sockets' three internal gripping springs are tin-plated in order to form a good metal-to-metal contact with similar metals. Most resistor leads are tin-plated.

Determining the Correct Value of Loading for a MC Cartridge.

First off, loading an MC cartridge does change its sound. Recommendations abound, so we may as well put in our own two cents' worth of advice: When used with no loading (with no resistors inserted into the MC LOAD sockets), most typical MC cartridges will present their most dynamic, loudest signal. But the tonal balance will be too bright, and may sound unacceptably edgy. As loading is applied, the brightness and edginess can be tamed. Too much loading, however, will darken the sound unrealistically and constrict the dynamic range until the sound begins to flatten out. It is our recommendation that a loading range between 68 to 100 ohms will offer the best compromise. Less loading (values greater than 100 ohms) will result in a too-bright sound while more loading (values under about 68 ohms) compresses the signal's dynamic range too much. Remember that the above recommendation is based upon our experience with *typical* low-output MC cartridges (0.3 to 0.5mV). If your cartridge is of an unusual design you may wish to consult your dealer or the manufacturer of the cartridge for advice (please don't call us: the chances that we are currently using the same cartridge as you are quite slim). Or try some actual experimentation. Try the cartridge unloaded, then with around 30 ohms, then around 100 ohms. As you listen, be aware that the more a cartridge is loaded, the less loud its signal is going to be and adjust the volume control accordingly. If you have several duplications in your CD and LP collection—and a decent CD player—you can use them to compare against while listening to the effect of the loading.

Balancing the Phono Stage.

If you replace either of the phono tubes (V1 or V2), or have a phono cartridge with unequal right and left channel output levels, you may wish to balance the phono stage. Located on the circuit board, between the two rear selector switches, are two small screwdriver-adjust PHONO GAIN TRIM trimpots marked "VR600A" and "VR600B." These controls may be used to fine-tune the output levels of the two channels. The following procedure may be used:

- Remove the top cover of the SA-3000.
- Reconnect the SA-3000 to the wall outlet and turn it on, allowing it to warm up for about 10 minutes.
- Turn both GAIN TRIM pots to fully clockwise. Do not change the settings of any other trimpot.
- While listening to a record, turn down the channel that is too loud using the appropriate trimpot. VR600A is the control for the Left Channel, VR600B turns down the Right Channel.
- After you have achieved a decent balance, replace the top cover after first unplugging the SA-3000 from the AC wall outlet.

Adjusting Phono Stage D.C. Offset.

If you experience "pops" or "thumps" when you switch the INPUT SELECT knob from "CD" to "phono," you probably need to adjust the D.C. offset of the Phono stage. Doing so is simple, but requires the use of a digital multimeter. Radio Shack and Sears sell inexpensive models that will work acceptably. Use the following procedure to "zero" the DCO of the Phono stage.

- You will need some method to connect your multimeter to the "tape output" jacks. We recommend that you use one of those crummy interconnects supplied with some audio/video components and cut off one end. Strip the wire so that you can connect the center conductor to the "+" lead of your multimeter and connect the outer shield conductor to the "-" lead of your multimeter.
- Unplug the SA-3000 from the AC wall outlet and remove the top cover.
- Set the SA-3000 to the "standby" mode and plug it back in.
- Set the "input select" knob to "phono." Set the "tape 1 monitor" knob to "source."
- Set your multimeter to the 2 Volts D.C. scale and connect it to either of the top "tape output" jacks. Any voltage shown is the DC offset of the channel A phono stage.
- With a small screwdriver, adjust channel A's "PHONO OFFSET" trimmer (VR4) to reduce the indicated voltage to as close to 0.000 volts as possible. Refer to the drawing showing the location of the trimmers.
- Move your multimeter to either of channel B' "tape output" jacks and repeat the process, using channel B's "PHONO OFFSET" trimmer (VR104).

- This completes the process. You may wish to leave the unit on for an hour or so and re-check both voltages in order to trim out any drifts caused by component heating.

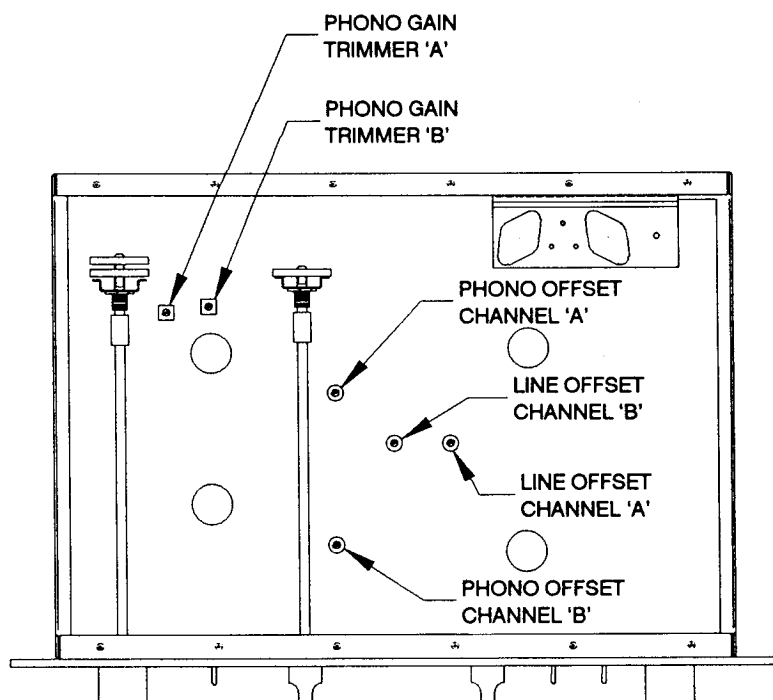


Figure. Location of D.C. Offset trimmers.

Adjusting Line Stage D.C. Offset.

If you experience “pops” or “thumps” when you move the Mute/Operate switch up and down you probably need to adjust the D.C. offset of the Line stage. Doing so is simple, but requires the use of a digital multimeter. Radio Shack and Sears sell inexpensive models that will work acceptably. Use the following procedure to “zero” the DCO of the Line stage.

- You will need some method to connect your multimeter to the “main output” jacks. We recommend that you use one of those crummy interconnects supplied with some audio/video components and cut off one end. Strip the wire so that you can connect the center conductor to the “+” lead of your multimeter and connect the outer shield conductor to the “-” lead of your multimeter.
- Unplug the SA-3000 from the AC wall outlet and remove the top cover.
- Remove tube V4 (located at the right rear of the circuit board) and set it aside.
- Turn off your power amplifier and disconnect it from the SA-3000.
- Set the SA-3000 to the “standby” mode and plug it back in.
- Turn the “gain” control to minimum, set the “standby/ready” switch to “ready,” and set the “mute/operate” switch to “operate.”

- Set your multimeter to the 2 Volts D.C. scale and connect it to either of the top "main output" jacks.
- When the SA-3000 unmutes (green light), any voltage shown is the DC Offset of the channel A Line stage.
- With a small screwdriver, adjust channel A's "LINE OFFSET" trimmer (VR6) to reduce the indicated voltage to as close to 0.000 volts as possible. Refer to the drawing showing the location of the trimmers.
- Move your multimeter to either of channel B' "main output" jacks and repeat the process, using channel B's "LINE OFFSET" trimmer (VR106).
- This completes the process. You may wish to leave the unit on for an hour or so and re-check both voltages in order to trim out any drifts caused by component heating.
- Unplug the SA-3000, install tube V4 and replace the top cover.

ADJUSTMENTS REQUIRING THE HELP OF A TECHNICIAN

Obtaining Service Manuals (outside the U.S.). All service in the United States is performed at the Counterpoint Factory. Authorized Counterpoint Distributors outside of the U.S. may obtain the SA-3000 Service Manual if repair or serious troubleshooting is needed. However, most routine maintenance is described below and can be performed by a competent technician familiar with tube audio electronics.

Aligning the Audio Stages.

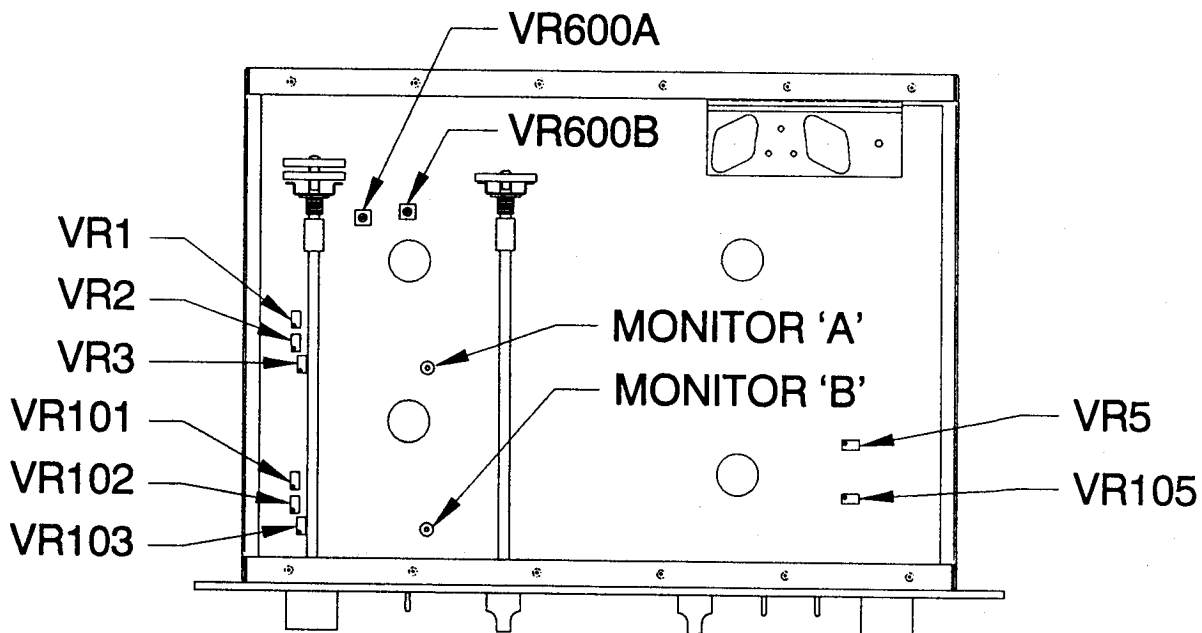


Figure. Location of Technician's Trimmers described in Audio Stage Biasing

If tube replacement becomes necessary, it is recommended (but not essential) that the bias adjustments in the SA-3000 be checked to confirm that the device is operating in accordance with its specified performance. However, before you bring the SA-3000 to a technician, use the new tubes for a week to allow them to “burn in” and settle to their long-term characteristics.

Biasing the Phono Stage.

If tubes V1 or V2 have been replaced, it will be necessary to check the phono stage bias. The following procedure will describe the process.

1. Set up the SA-3000:
 - Remove the top cover from the Audio Chassis.
 - Set the two internal Phono Input Selector Switches to the “MC” position.
 - Install shorting pins into the “MM phono inputs” on the rear of the SA-3000.
 - Locate both “MM BIAS” trimpots (VR1, VR101) and set them fully CCW (counter-clockwise).
 - Locate both “PHONO GAIN” trimpots (VR600A and VR600B) and set them fully CW (clockwise).
 - Connect the transformer box to an AC outlet and apply nominal AC Mains voltage.
2. Set the Front Panel Controls:
 - Set toggle switches: select “stereo,” “operate” and “ready.”
 - Set the “input select” knob to the “phono” setting.
3. Make Signal Connections:
 - Connect a 1kHz, 10mV rms low distortion sine-wave signal to the channel A “MC” input on the rear of the SA-3000.
 - Connect a distortion analyser to the channel A “MONITOR” jack on the circuit board. The jack is located directly behind tube V2.
4. When the unit has warmed, you should read a signal of about 1.7 volts rms.
5. Locate “MC BIAS” Trimmer VR2, about halfway back on the Left edge of the circuit board.
6. Use Trimmer VR2 to adjust the stage for lowest distortion. When adjusted properly, gain should be about 45dB and distortion should be less than 0.04%. Stage plate voltage measured on the left side of resistor R1 (A,B,C or D) will be in the 105 to 135 volts DC range.
7. Note the measured gain of the stage and write it down as ‘channel A MC gain.’
8. Return to Step 6 and repeat the procedure for the “B” channel phono stage. This stage is laid out identically to the “A” channel phono stage. Use trimmer VR102 to trim this stage.
9. Note the measured gain of the stage and write it down as ‘channel B MC gain.’

10. Set the two internal Phono Input Selector Switches to the "MM" position.
11. Use a 'Y' cord to connect the signal generator to both "MM phono inputs."
12. Install shorting pins into both "MC phono input" jacks.
13. Set the signal generator to a signal level of 20mV rms, 1kHz.
14. Measure the signal level at both "monitor" jacks. Signal gains should be on the order of 28 to 29dB (500mV).
15. By turning either "MM BIAS" Trimmers V1 or V101 CW, you can reduce the gain of either channel. Use these controls to match the *gain difference* between the two channels to those noted earlier e.g., if your noted 'channel A MC gain' was 46.0dB, and 'channel B MC gain' was 45.5dB you should adjust the trimmers to achieve a channel B MM gain 0.5dB lower than that read on channel A.
16. Measured distortion should be less than 0.1%.
17. Reset the two internal Phono Input Selector Switches to the "MC" position.
18. Insert shorting pins into all four phono input jacks.
19. Use a 100 to 1000uF electrolytic capacitor to AC couple the signal generator to the A channel "monitor" jack. Connect the + side of the capacitor to the monitor jack.
20. Set the generator to 500mV rms, 1kHz and monitor the generator's distortion to be certain that it can satisfactorily drive the 6000 ohm load presented by the first stage's buffer amplifier.
21. Connect the distortion analyzer to the A channel "tape out" jack.
22. Use "PSS BIAS" trimmer VR3 to adjust the stage's distortion to minimum.
23. When properly adjusted, the distortion should be less than 0.005% and stage gain should be around +3.0 to +4.0dB (700 to 800mV). Stage plate voltage measured on the Right side of resistor R8 (A,B,C or D) will be around 80 to 110 VDC.
24. Return to Step 19 and repeat this procedure on the B channel.
25. Use a 'Y' cord to re-connect the signal generator to both "MC phono inputs" and set the generator to 1mV, 1kHz.
26. Monitoring the signal levels at the "tape out" jacks, use "PHONO GAIN" Trimmers VR600A and VR600B to match the two phono stage output levels. VR600A controls the A channel level, VR600B the B channel.
27. This completes the phono section bias procedure.

Biasing the Line Stage.

If tube V3 has been replaced, it will be necessary to check the line stage bias. The following procedure will describe the process.

1. Set up the SA-3000:
 - Remove the top cover from the Audio Chassis.
 - Connect the transformer box to an AC outlet and apply nominal AC Mains voltage.
2. Set the Front Panel Controls:
 - Set toggle switches: select "mono," "operate" and "ready."
 - Set the "input select" knob to the "CD" setting.
 - Set the "tape 1 monitor" knob to the "source" setting.
 - Set the "balance" knob to the center.
 - Set the "gain" knob to fully clockwise.
3. Make Signal Connections:
 - Connect a 1kHz, 90mV rms low distortion sine-wave signal to the channel A "CD" input on the rear of the SA-3000.
 - Connect a distortion analyser to the channel A "main output" jack on the rear of the SA-3000.
4. When the unit has warmed, you should read a signal of about 2 volts rms.
5. Locate "LS BIAS" Trimmer VR5.
6. Use this Trimmer to adjust the stage for lowest distortion. When adjusted properly, gain should be about 24dB and distortion should be less than 0.02%. Stage plate voltage measured on the Right side of capacitor C14 will be in the 35 to 45 volts DC range.
7. Return to Step 3 and repeat the procedure for the "B" channel line stage. This stage is laid out identically to the "A" channel line stage. Use trimmer VR105 to trim this stage.
9. This completes the line stage bias procedure.

TUBE REPLACEMENT

The average tube life expectancy for the SA-3000 is 2 to 3 years. When replacing a tube in your SA-3000, be certain that you replace it with an exact type as indicated in the Specifications section of this Owner's Manual. Unless you know exactly what you are doing, any attempt to replace a tube with a type other than specified will void your warranty.

How We Choose Our Tubes.

We get numerous suggestions from many people about different brands or types of tubes to use. You may have found what you consider to be an excellent tube. FYI, these are the things we look for when we buy tubes:

1. Large quantities available.
2. Good sound.
3. Excellent yield, (a large percentage are quiet enough for use in audio electronics).
4. Reliable operation.

It is very difficult to satisfy all four points. Some brands have great sound and large quantities available, but only 1-2% are useful to us due to high microphonics or noise level. Some others are quiet and sound good, but we can only find 200 of them (we purchase about 18,000 to 20,000 tubes each year). Some brands are plentiful, have good sound and a high yield at first, but only last about 1 to 6 months before they become noisy, and since we have about 6500 preamplifiers and amplifiers being used by customers at this time of writing, long life is very, very important to us. Any brand of tube that meets all four criteria will be considered for use in Counterpoint products.

How We Test Our Tubes.

New tubes are aged for 160 hours. Then they are plugged into an Audio Precision™ computer-aided tester and measured. At this point we are checking for noise, noise stability, and microphonics (ringing). A Pascal program with over 2,500 lines of code sorts them into seven categories ranging from very, very good to garbage. The very, very good tubes are possible candidates for phono sections, the next five categories may be used in less critical applications, and the garbage tubes are good for nothing. Too light for paperweights.

These tubes are then installed into new Counterpoint products and the noise is re-checked, the microphonics are re-checked, and distortion and signal amplification are measured. A large percentage of tubes are rejected again. We then age the entire product, with its new tubes, for 48 hours (in a very hot room) and then everything is checked again. Then, after the top cover, front face panel and knobs have been assembled onto the product, it is listened to and checked for sound quality, noise and microphonics again. All together, by the time you have received a Counterpoint product, its tubes have had over 200 hours of use and have undergone 35 individual tests and measurements.

Where to Obtain Replacement Tubes.

There are a number of sources for the tubes used in the SA-3000. However, most of the different makes of tube typically range from fair to poor. We have evaluated a broad sampling of the tubes manufactured in, or imported into, the U.S., and feel that the brand of tube we use gives the best sonic performance. If you wish to preserve the sonic characteristics of the SA-3000, be certain to have your dealer contact Counterpoint, or contact Counterpoint directly, and obtain your tubes from us. We will be certain that your replacement tubes operate perfectly in an SA-3000 by testing them in an SA-3000. Other suppliers of tubes do not offer this service.

When requesting replacements, please specify where the tube is located in your SA-3000 (V1, V2 or V3). V1 and V2 are the PHONO tubes, V3 is the LINE tube. These designations are printed on the unit's tube board, beside the tube sockets.

Tube Life.

The SA-3000 has been conservatively designed. Therefore, you should get thousands of hours of use before tube replacement becomes necessary. Some indicators of failing tubes are a loss of highs or lows, inadequate gain, excessive noise or an increased amount of distortion.

BEFORE REMOVING TUBES FROM YOUR SA-3000, BE CERTAIN THAT IT HAS BEEN DISCONNECTED FROM THE AC WALL RECEPTACLE FOR AT LEAST TEN MINUTES TO ENSURE THAT INTERNAL HIGH VOLTAGES HAVE DRAINED TO A SAFE LEVEL.

Before inserting a tube into its associated socket, be certain the tube pins are completely straightened. This will prevent possible damage to either the tube or the socket. Be very careful during this procedure as there is only one way a tube can be inserted into its socket without causing damage.

GETTING TO KNOW TUBES AND YOUR SA-3000

Short and Long Term Reliability.

Sometimes people expect too much from these complex, fragile little devices. Every time power is applied to a tube it heats up. Filaments reach 1200 degrees K. Internal parts heat and shift, sometimes causing bits of cathode material to crack loose. When the tube is turned OFF, everything shifts again. High noise levels can be due to impurities on the grid wires or cathode plating. Sometimes, after a tube has been used for some time, impurities can be uncovered, and cause the noise level to increase. Like a loose shingle on a house, a flake of cathode material can lift in the electron wind and cause noise instability (sputter).

Some of these events can come and go, or only occur during the first 30 minutes after the tube has been switched on. Others may get worse as time goes on. At Counterpoint, we age the tubes before we test them. This puts a few hours onto the tube, but there is no way we can predict what they will do a week or a year after they leave the factory. And if we do a lifetime aging process (maybe 3 years?) we couldn't sell the tube because it would then be an old tube.

Why Are Some Tubes Bad by the Time You Receive Them?

You've just brought your SA-3000 home, and the first time you listened to it you noticed that you had a noisy tube. Why? It's a new unit, Counterpoint won't ship anything until it has been measured and listened to, and yet you have a noisy tube. The reason is shipping vibration, plain and simple. While we do all that we can to protect a tube from shocks and breakage, there is very little that can be done to keep truck and airplane vibrations from shaking the tube for hours. A stray particle of cathode coating material can shake loose and

cause noise instability. The grid wires (which are thinner than human hair) can shift and become microphonic (like a guitar string). The next time you have a damaged tube, break it open (in an old towel) and see how it is constructed. Dissect it and notice how fragile all the parts are. These are the simple facts of tube construction and there is nothing you, we, or the military can do about it.

A tube's insides are far more fragile than the insides of a light bulb. In a light bulb, all the manufacturer has to worry about is long life and good light output. It doesn't matter if the filament wire is leaning to one side, or if the coating of the filament has some loose flakes, the bulb will work. But a tube has about 1,000 times the requirements to operate satisfactorily. Everybody knows that if you shake a light bulb briskly for about 10 minutes there is a good chance that the filament might break, making the bulb useless. The same concept applies to a tube used for audio, but to a far larger extent.

Dealing With Tube Problems, and the Secret to a Happy Life With Tubes.

Problem 1: Tube noise when the unit is first turned on. Tubes need a chance to warm up, to stabilize, so that they can settle down and perform the way that they did at Counterpoint. If the SA-3000 or the tubes are new, allow 24 hours for the tubes to settle.

Problem 2: Tube noise later in life. It's going to happen. But, the longer a tube stays quiet, the longer it is likely to stay quiet. If one tube goes sour in an SA-3000, that's two out of the three tubes inside an SA-3000 that are proving themselves trustworthy. Replace the bad tube.

It really boils down to education about tubes in an audio application. Equanimity. Poise and tranquility. If a tube becomes noisy or microphonic, it is not a failure of the electronics! Don't get upset, just replace the tube. A bad tube does not indicate that the unit is defective, it simply indicates that the tube is bad.

There are times when it is appropriate to have an entire appliance replaced...and times when a simple plug-in parts replacement is all that is needed. People won't send a lamp back to the factory simply because the light bulb burned out. There is no reason to do so with tube audio product.

Understanding about noisy tubes, microphonic tubes and tubes with noise instability (sputter) will make troubleshooting vacuum tube electronics much easier.

Some folks expect tubes to behave like transistors. They will not. Guaranteed. They need to be worked with. Attention, patience and knowledge are important qualities when dealing with vacuum tubes.

Tubes are not perfect, but they DO sound great.

CARE

Be careful not to allow foreign materials to enter the SA-3000 through the ventilation openings on the top. Do not insert an implement of any nature into these openings. To avoid potential electrical shock, do not operate the SA-3000 in a damp, rainy or moisture-filled environment and never operate the SA-3000 with its top cover removed.

Remember, the faceplate of your SA-3000 is manufactured from an aluminum alloy which is an extremely soft metal. It cannot withstand the careless use of tools during installation into a cabinet or rack.

When cleaning the exterior of your SA-3000, the direct use of dusting sprays, abrasive cleaners and particularly alcohol should not be used. At Counterpoint, detail cleaning of all metal surfaces is done using Windex™ spray glass cleaner or diluted ammonia solution. However, because the formulas for cleaners of this type vary, or change without notice, Counterpoint will not assume responsibility for the results obtained with any particular product.

FUSES

A.C. Mains Fuse. This fuse is located on the external transformer box. If this fuse blows it is most likely an indication of a fault in the SA-3000. However, it is possible that the fuse itself may have been faulty, so you may wish to try a new one before you call you dealer.

CAUTION! HAZARDOUS VOLTAGES!

Before replacing this fuse, be certain that the SA-3000 is disconnected from the A.C. receptacle. The replacement value of this fuse is 1 Amp Fast Blow. Use of a larger or slower fuse can void your warranty.

WARRANTY INFORMATION. READ ME.

Your Counterpoint SA-3000 Preamplifier was engineered and built by dedicated people, with manufacturing techniques designed to achieve the highest standards available in the industry. In addition, each Counterpoint SA-3000 receives 100 hours of tube burn in and tubes match-up, for proper operation. Each Counterpoint SA-3000 Preamplifier undergoes rigorous testing procedure and has been checked twice by Audio Precision™ Computer-Aided Testing equipment, to catch any failure-prone devices, or components not up to spec which may have not revealed themselves during the breakdown tests. As a final step, each and every unit is listened to before it is shipped out from Counterpoint.

The Standard 90 Day Warranty

We Stand Behind Our Products With The Following Warranty.

Counterpoint hereby warrants that it will repair or replace, at its option, any part of the SA-3000 Preamplifier with which this warranty is enclosed which proves defective by reason of improper workmanship and/or material, without charge for parts, labor, and tubes for a period of 90 Days. This warranty period commences on the date of original purchase by the buyer.

When Warranty Service Is Needed.

To obtain service under this warranty you must return your Counterpoint SA-3000, properly packaged in its original container, to the nearest authorized Counterpoint dealer from whom the product was purchased. Any postage, insurance and shipping costs incurred in presenting or sending your Counterpoint SA-3000 for service are your responsibility. However, Counterpoint will return the product via prepaid, insured freight. Method and carrier to be determined solely by Counterpoint Electronic Systems, Inc.

The Dealer's original bill of sale or other satisfactory proof of the date of the original buyer of your Counterpoint SA-3000 must be made available to obtain service under this warranty.

The warranty applies only if your Counterpoint SA-3000 fails to function properly under normal use and within the manufacturers's specification.

Under no circumstances will the following be included as warranty coverage:

- 1. Any Counterpoint SA-3000 Preamplifier not operated in agreement with the instructions contained in the owner's manual.
- 2. Any resulting damage of any nature.
- 3. Any Counterpoint SA-3000 Preamplifier which, in our strict judgement, has been repaired, altered or modified by any facility or personnel not authorized by Counterpoint Electronic Systems, Inc.
- 4. Any Counterpoint SA-3000 Preamplifier which, in our strict judgement has been subject to neglect, abuse, accident, tampering, or has had its serial number removed or defaced.

This warranty gives you detailed legal rights. You may also have other rights which are inherent within your own state.

Direct shipments to the factory will not be accepted without a Counterpoint Return Authorization Number (RA).

Be Prepared! Counterpoint will need the following information for warranty authorization:

1. The Model Number.
2. The Serial Number.
3. Your Name, Address, and a daytime phone number.

If your SA-3000 is returned for warranty repair or general repair and Counterpoint finds it to be not defective, it will be returned with a handling fee of \$65.00, plus return shipping charges. Therefore, be very certain that any problem you may be experiencing is actually due to a failure of the preamplifier. If there are unusual circumstances surrounding the failure, **please describe them clearly in an accompanying note so we may more easily duplicate the conditions.**

If an SA-3000 Preamplifier is shipped to the factory for repair or update and is found to be packed in other than the original shipping materials, Counterpoint will re-package the unit in a factory carton for return shipping. You will be charged a nominal fee for the new material.

It is Counterpoint's policy to defer to the consumer whenever a reasonable doubt exists. However, freight charges and handling fees will be billed for any units or parts returned under warranty and found by Counterpoint to be operating in accordance with their specifications.

Warranty Service Outside The U.S.A.

To those Counterpoint products whose customer purchase was made outside the United States and its territories, warranty conditions will be extended by the importing distributor, which may be different from those warranty conditions specified above. Warranty service, if needed, is the sole responsibility of the importing distributor or foreign dealer.

If a Counterpoint product is removed from the country in which the consumer purchase was made, Counterpoint distributors and/or authorized dealers in any subsequent country are not obligated by the terms of this warranty. Any repairs under the terms of this warranty will be made at the discretion of the distributor or dealers.

The Three Year Extended Warranty

How To Extend The Limited Warranty To A Three Year Warranty.

The SA-3000 automatically comes with a 90-day Warranty. You can extend this to a three-year period by simply mailing us a photocopy of the Dealer's original bill of sale or other satisfactory proof of the date of the original buyer purchase of your Counterpoint SA-3000. This will firmly establish authorized dealer, model number, serial number and ownership.

Please send a photocopy of the sales receipt to the following address:

Counterpoint Electronic Systems, Inc.
2610 Commerce Drive
Vista, CA. 92083
Atten: Warranty Registration

You will receive, via return mail, the Optional Three Year Warranty certificate for your records.

The Optional Three Year Warranty covers all parts and labor. It excludes vacuum tubes. The vacuum tubes are covered under the Standard 90 Day guarantee.

Transfer Of Warranty

- If the original owner established warranty for your Counterpoint SA-3000, you will need to provide the following paperwork:
 1. A bill of sale from the seller to the new owner will firmly establish a transfer of ownership.
- If the original owner did not establish warranty and you wish to establish a warranty for your Counterpoint SA-3000, you will need to provide the following paperwork:
 1. The original bill of sale from the Audio Dealership to the first owner.
 2. Any and all subsequent bill(s) of sale from owner to owner.

All transfer of ownership paperwork should be sent to the following address:

Counterpoint Electronic Systems, Inc.
2610 Commerce Drive
Vista, CA. 92083
Atten: Warranty Transfer

You will receive, via return mail, an Optional Three Year Warranty certificate for your records.

Notification Of Product Improvements

Because Counterpoint always strives to improve existing products through ongoing research into new technology and materials, we reserve the right to incorporate design refinements without notice or obligation. For this reason, any current Counterpoint product may differ in some respects from its published description but it will always equal or exceed the performance of the original design.

Whenever possible, these design modifications will be incorporated in prior units. All owners will be notified, through the mail service, of the modification via their product warranty registration. Design modifications will be made through any authorized Counterpoint dealer or through Counterpoint, for a reasonable charge.

Warranty Extension Program

Counterpoint offers a warranty extension program to all owners with warranty on file. Once the Three Year Warranty has expired, you will be notified of your option to purchase (at a reasonable cost) an additional Three Year Parts and Labor Warranty (excluding tubes).

BEFORE YOU CALL YOUR DEALER OR THE FACTORY: TROUBLE-SHOOTING.

Important!

If your SA-3000 is returned for warranty repair or general repair and Counterpoint finds it to be not defective, it will be returned with a handling fee of \$65.00, plus return shipping charges. So be thorough and careful with your system set up and troubleshooting.

Assistance From Your Local Dealer Or Dealer Of Purchase.

Your Counterpoint Authorized Dealer is your best source of assistance he is in a much better position to help because he knows you, your needs and your system. In addition, your Dealer is backed up by the special support resources within Counterpoint.

Trouble-Shooting. A Quick Check Of The Obvious.

- Is the AC power cord properly attached?
- Are the tubes inserted properly into the respective tube sockets?
- Is the READY/STANDBY switch in the READY position?
- Is the MUTE/OPERATE in the OPERATE position?

Trouble-Shooting. A Check Of The Not-So-Obvious.

Hum only with the Phono input.	Check the connection of your turntable's ground wire to the CHASSIS GROUND binding post on the rear of the SA-3000.
Pinging or Ringing sound when you change a switch or tap the front panel.	All tubes are microphonic to some extent. If you feel that the level of microphonics is unacceptable, or it is steadily getting worse, you should contact your Counterpoint dealer to obtain a new tube. But first ascertain which tube is the culprit. 1. If the microphonics occur on all inputs, regardless of volume control setting, tube V3 (the line tube) is at fault. 2. If the problem occurs only on phono listening, and goes away when the volume control is reduced to fully off, the problem is one of the phono tubes. The easiest way to determine the ringing tubes is to remove the top cover and, while listening, use the eraser end of a pencil to gently tap tube V1 then V2. You will be able to determine which tube is at fault. Contact your Counterpoint Dealer to obtain a replacement tube, and be certain to tell him which tube you need.

Tubes light but the LED does not.	Broken LED, broken wire or bad connection to the circuit board, replace or correct as necessary.
No sound. Tubes and LED do not light.	Check to see if the transformer box fuse has blown. Replace fuse with exact fuse value.
No sound. Tubes and LED <u>do</u> light.	Try replacing High-voltage rectifier tube V4. It is a 6CA4 tube, a very common type which may often be easily obtained from a local TV-radio repair shop or contact your Counterpoint dealer for a replacement.
The SA-3000 turns itself off and the front LED lamp goes dark.	Check that the rear panel of the SA-3000 has adequate cooling. The filament regulator is designed to shut itself off if it overheats.
Hum in all inputs.	1. Check for electrical ground loop. Only one component in your system should be 3-prong grounded to the AC receptacle. Use ground cheaters to lift all but one component from AC ground. 2. Disconnect all source components (FM Tuner, turntable, etc.). If hum is eliminated, connect the components back to the SA-3000 one at a time until the problem re-occurs. Contact the manufacturer of the component and inform them of your problem and troubleshooting technique. 3. If the hum remains, use the MUTE/OPERATE switch to mute the output of the SA-3000. If the hum is gone then the cause of the hum is within the SA-3000. 4. If the hum remains, with the SA-3000 muted, then the hum is being generated after the output of the SA-3000. Check the cables between the SA-3000 and your power amplifier; it is possible that they are running parallel to an AC Mains line. Hum may also be induced into the input of your power amplifier if the two stereo input cables do not follow the same path to the amplifier. Route the cables right next to each other and see if the hum vanishes. Finally, if you still have a hum, turn off your power amplifier and removed the cables from its input. Replace the cables with shorting plugs at the amplifier input. If, after you turn on the amp, the hum is still present, the problem lies in your power amplifier. You will need to contact your power amplifier's manufacturer. In short, when the SA-3000 is connected to your amplifier, and the SA-3000's inputs are all shorted and you hear a hum ONLY if it is unmuted, the hum is generated within the SA-3000. If this is the case, contact your dealer to obtain a Return Authorization Number from Counterpoint.

Hum emanating from the Transformer.	1. All transformers vibrate. The noise from the transformer can usually be heard from within a foot of the box. If the hum is much, much louder, there may be a problem with your SA-3000, but first be certain that the unit is not resting on a surface that might amplify the noise, such as a wooden shelf. A piece of carpeting under the box can help. You also may be in an extremely quiet location. 2. If the transformer hum is excessive and can be heard from several feet away, you may possibly be experiencing a failure of the transformer or rectifiers. Contact your dealer to obtain an R.A. Number from Counterpoint so it can be shipped to the factory for repair.
Rushing, Hissing or Rumbling Noise	Possibly a bad tube. Rumbling Noise. 1. In most cases, leaving the unit ON will eliminate the noise. 2. If time doesn't cure the problem, replace the bad tube. If the noise is audible in one PHONO channel only, swap tubes V1 & V2 (see tube chart for proper location). If the problem goes away, you've taken all the corrective action that needs to be done. If the problem travels to other channel you need to determine which tube is noisy one (use the eraser end of a pencil to gently tap V1 then V2 to determine which tube is feeding which speaker). If the right speaker has the tube noise, and you hear the tapping from the right speaker when you tap (for example) V1, then V1 is the culprit. 3. If the noise is located in the line section only (audible with all sources, and even with the volume control at minimum), the problem tube is V3. 4. If the noise does not go away when you mute the SA-3000, the problem most likely is in your power amplifier since the mute switch shorts the output of the SA-3000 to ground. BE CERTAIN THAT YOU PUT THE TUBES BACK INTO THEIR ORIGINAL LOCATION. Contact your Counterpoint Dealer and tell him which tube (V1, V2 or V3) you're having trouble with. He can obtain a new one for you.

Degraded sound	The inputs of some solid-state tape recorders can degrade the sound quality of your SA-3000, especially when the tape machine is turned off. This is because the audio source you are listening to is also connected to the TAPE OUT connectors and the input of the tape machine which, if turned off acts like to a diode and can cause considerable distortion. The solution is to leave your tape recorder turned on whenever you wish to listen. We have also seen some cases where the input of a tape machine's electronics are so poorly designed that they can add a noticeable degree of shrillness, edginess or just plain irritation to music even when turned on. The solution here is just to disconnect the darn thing except when you actually desire to record something.
A new SA-3000 that sounds different than the one you heard in a dealer's showroom.	A new SA-3000 will not give the same sonic performance as one that had signals sent through it and has been burned in, so please give the SA-3000 a little more time. Connect it to play music and let it play for 24 to 48 hours. We can suggest turning off your power amplifier and connecting an FM tuner to the phono jacks, selecting PHONO with the INPUT SELECT control and setting the GAIN control to about 9:00. Be careful not to turn on your power amplifier until you have disconnected the tuner, since the output of a tuner is a high-level source hundreds of times louder than a phono cartridge. This high amplitude signal will speed the forming of the various capacitors and components. If you also upgraded your interconnects at the same time as your preamplifier, the above break-in applies to them as well: We've experienced some highly-regarded cables that had no bass until they were broken in. Honest.

TECHNICAL DESCRIPTION

Product Background.

The SA-3000 represents the result of hundreds of hours building prototype circuits, measuring circuit performance and listening to dozens of audio amplification, buffering and power supply designs.

We are confident that the technology used in your SA-3000 is absolutely state of the art in terms of sonic performance.

We are also confident that the circuit designs in your SA-3000 offer unmatched specifications for a preamplifier that was designed with no global feedback and therefore with the sole purpose of recreating music uppermost.

The following goals were set in determining the final designs:

- In the signal voltage amplification stages a means was sought of dropping all measureable forms of distortion by an order of at least one magnitude without feedback, while preserving the desirable sound quality of vacuum tubes.
- Extending that desirable sound quality of tubes down to the deep bass and into the high treble regions without incurring a liability in terms of “solid-state” sound.
- Buffering the tubes to prevent the typical loss of definition in the bass and the softening of the highs due to their needing to drive difficult loads, yet assuring that any such buffering circuitry be as transparent as possible to prevent loss of information or adding sonic artifacts of any sort.
- All power supplies that have any influence on the sound quality of the audio circuitry be sonically inert and free of colorations.

At all times, circuit developments were listened to and compared against “straight wire” (where possible), or compared against known good designs to determine the effects of design changes.

In areas of objective performance (measurements) we met our goals. In terms of sonic performance we feel that we surpassed them.

Phono Stage.

First Phono Gain Stage.

MC Mode. With the internal switches set to “MC,” and shorting pins inserted into the “MM Phono Inputs,” the first stage is biased as a JFET/triode cascode. Signal from the “MC” input is AC coupled to the gate of N-channel JFET Q1 (Q101) through capacitor C2. “MC BIAS” trimmer VR2 (VR102) is also connected to the gate of Q1 and is used to control the minus gate bias supplied to the gate of Q1. This control is used to adjust the stage to minimum distortion. Configured as a common-source voltage amplifier, the drain of Q1 drives the cathode of 1/2 of triode V1. The grid of V1 is grounded by the shorting pins in the “MM” input. This topology has a voltage gain of about 46dB.

MM Mode. With the internal switches set to “MM,” and shorting pins inserted into the “MC Phono Inputs,” the first stage is biased as a simple triode common-cathode voltage amplifier. Gate voltage for Q1 is adjusted by “MM BIAS” trimmer VR1 (VR101). This control permits adjusting the gain of the stage by adjusting the resistance of Q1, and thus the cathode degeneration applied to V1. Shorting pins in the “MC” input AC couple the gate of Q1 to ground, bypassing noise. This topology has a voltage gain of about 26dB.

Second Phono and Line Gain Stages

Both the Second Phono Gain Stage and the Line Gain Stage must work well when driven from a high source impedance. In the case of the second phono stage, the output of the

RIAA de-emphasis network is on the order of tens of thousands of ohms. A similar situation exists for the line stage when driven from the wiper of the volume control.

It is common for these stages to be configured as common-cathode voltage gain circuits, with the signal connected to the grid of the amplifying triode. However, in a high source impedance situation, this topology leaves much to be desired in terms of high-frequency response, as the high source impedance can exacerbate Miller capacitance effects. In addition, a marked variation in grid resistance—due to grid current—can be seen to cause surprisingly high amounts of waveform distortion with even moderate signal drive levels when sourced from a large impedance.

On the other hand, the cathode input of a triode when used in a common-grid configuration shows no Miller Effect and is extremely linear (no grid current problems) when driven from a low source impedance. The Second Phono gain stage and the Line gain stage use a P-channel FET in source-follower configuration to drive the cathode of the amplifying triode (U.S. Pat. No. 4,163,198, David W. Berning, assignor). This topology is similar to the cathode-connected gain stage used in the Counterpoint SA-11 in that the first signal element is used only to convert voltage to current, and also similar in the extremely low distortion obtainable due to the complementary nature of the two device's transfer functions.

The gate of FET Q4 (Q104), Phono second stage; and Q5 (Q105), Line stage, are biased positive by "PSS BIAS" trimmer VR3 (VR103) for the second Phono stage and "LS BIAS" trimmer VR5 (VR105) for the Line stage. These controls are adjusted for minimum waveform distortion. The drain of the FET is grounded, and the source is connected to the cathode of 1/2 of V1 (V2), Phono second stage; and the cathode of 1/2 of V3, Line stage.

Grid bias for the triodes is a fixed +1.7V, supplied by resistor-LED voltage references. During normal operation these four Grid Bias lamps (LED4,104,5 and 105) light Green. The developed signal voltage at the plate has a gain of about 24dB, with frequency response extending beyond 200kHz (even when driven by the wiper of a centered volume potentiometer) and distortions more than an order of magnitude less than is obtainable with a common-cathode configuration.

Buffers.

While the small-signal triodes used in preamplifiers are renowned for their liquid sound, they are relatively weak in their abilities to drive any kind of a load without high-frequency distortion due to current limitations. This reveals itself as a loss of sonic transparency in an audio circuit. The problem is especially troublesome at the output of the first Phono stage which is required to drive a passive RIAA de-emphasis network whose complex capacitive input impedance varies as a function of frequency by almost an order of magnitude, with the lowest input impedance at the higher frequencies.

A buffer stage, used between the signal-amplifying triode and the following load removes the need for the tube to do anything other than its intended purpose of amplifying the signal voltage. The buffer loads the tube only very lightly (1M ohm) and has the added advantage

of reducing the size of the tube stage's output capacitor to a smaller, more sonically accurate value since the load presented by the buffer is easily 10 to 100 times higher than driving the load directly. This permits low frequency response to be more easily controlled since the output of the buffer is DC-coupled to the load.

All stages in a preamplifier benefit from buffering: the Phono second stage gain tube is no longer required to drive the balance and volume potentiometers, and the Line stage gain tube is not required to drive long interconnects and the inputs of unknown power amplifiers.

In the SA-3000, buffering is performed by hybrid FET/Bipolar video current amplifiers (U1,U101,2,102,3,103). These integrated unity-gain voltage followers offer bandwidth in excess of 50MHz and use no loop feedback. They are not operational amplifiers. DC offset of the Phono Stage is adjusted with "PHONO OFFSET" trimmer VR4 (VR104), while DCO of the Line Stage is set with "LINE OFFSET" trimmer VR6 (106). The buffer stage following the first Phono gain stage is operated in a proprietary manner that allows it to drive the passive RIAA network in a constant-voltage environment, eliminating modulation of the device's internal current regulators by the high amplitude treble-intensive signal supplied by the unequalized and amplified phono cartridge output.

Power Supplies.

There are six power supplies in the SA-3000: +240 VDC high-voltage, +15 VDC, -15 VDC, +6 VDC, -6 VDC and +6 VDC tube filament. With the exception of the +240 VDC supply, all voltages in the SA-3000 remain on as long as the unit is connected to AC power.

+240 VDC High-voltage. The +240 VDC supply is used for anode ("B+") voltage by the audio tubes. Changing the front panel switch to "ready" turns on filament voltage to full-wave rectifier tube V4. As soon as the tube is warm it supplies unregulated DC to filter capacitor C500 and the high-voltage regulator circuitry.

The high-voltage regulator is comprised of transistors Q500, Q501, and MOSFETs Q502 and Q503, and all other "500-" prefix components. This circuit is the result of 4 months of voltage regulation design, uses no feedback and shows line regulation better than 0.8%; broadband noise less than 14uV, and an output impedance of less than 2 ohms. This circuit is self-protecting against output shorts. The very low dropout voltage of the circuit allows operation from 85 to 133 VAC input. The low output impedance and inherent sonic inertness of the design permits the elimination of decoupling RC networks at the output of the regulator.

Green lamp "I REF" (LED503) indicates normal operation of the circuit. The lighting of Red "NO LOAD" (LED502) will result if the unit is operated with no audio tubes. Red "CURRENT LIMIT" lamp (LED501) indicates that the regulator has gone into current limit due to excessive current draw.

+15 and -15 VDC Supplies. Three-pin regulators U400 and U401 supply + and - 15 VDC for use by the buffers.

+6 and -6 VDC Supplies. +6 VDC is used to bias the grids of the Phono second stage and

the Line stage tubes. -6 VDC is used for biasing the Phono first stage FET. Transistors Q400,401,402,403 and all other "400-" prefix devices are used in this circuit. The circuit is similar in operation to the +240 VDC regulator described above.

Green lamps LED400 and LED401 indicate normal operation of the two circuits.

+6 VDC Filament Voltage. This voltage is used to light the heaters in audio tubes V1,101 and V3. Adjustable three-pin regulator U300 and the other "300-" prefix components comprise this circuit.

SPECIFICATIONS

Tube Complement

3-6DJ8, Audio Amplification. V1,V2 & V3.

1-6CA4, Rectifier. V4.

Typical Electrical Specifications

Gain. @ 1kHz.

MC Phono to Main Out: 77dB.

MM Phono to Main Out: 60dB.

Line Input to Main Out: 24dB.

Frequency Response (per IHF).

Line Stage: +0.0/-3.0dB: <2Hz to 300kHz.

+0.0/-0.1dB: <8Hz to 40kHz.

Phono Stage (measured at Main Outs):

MC: +0.1/-3dB: <10Hz to >100kHz.

+0.1/-0.3dB: <10Hz to 60kHz.

MM: +0.1/-3dB: <10Hz to >100kHz.

+0.1/-0.3dB: <10Hz to 60kHz.

Distortion (per IHF).

Line Stage: 20 to 20kHz: <0.01% T.H.D. Max.

Phono Stage:

MC: 20 to 20kHz: 0.08% T.H.D. Max.

20 to 4kHz: <0.02% T.H.D.

MM: 20 to 20kHz: 0.2% thd Max.

20 to 4kHz: <0.035% T.H.D.

Signal to Noise.

Line Stage: 88dB (ref. 0.5V, EIA-weighted noise: 19uV, 10 to 500kHz).

MC Phono Stage: 71dB (ref. 0.5mV, EIA-weighted noise: 45uV, 10 to 500kHz).

MM Phono Stage: 76dB (ref. 5.0mV, EIA-weighted noise: 30uV, 10 to 500kHz).

Sensitivity (measured at Main Outs).

Line Stage: 24mV.

MC Phono Stage: 0.08mV.

MM Phono Stage: 0.5mV.

Input Impedance.

Line and Tape Inputs: Selected: 20k ohms.

Unselected: 100 ohms.

MC Phono Input: 47k, internal provisions for lower resistances.

MM Phono Input: 47k.

Output Impedance.

Main Outputs: 760 ohms.

Tape Outputs: 760 ohms (phono selected)

Maximum Input Levels (1% thd, 1kHz).

Line Inputs: 100 Vrms.

MC Phono Input: 20mV rms (32dB headroom)

MM Phono Input: 150mV rms (30dB headroom)

Line Stage Maximum Output Level.

24V p-p @ 1% thd, 20-20kHz.

Polarity.

Phono Stage: inverting.

Line Stage: non-inverting.

Power Requirements.

88 to 133 Volts, 50 to 60Hz (Domestic version).

Standby: 35 Watts.

Operate: 50 Watts.

Replacement Fuse Value.

100V/120V and 200/260V Versions: Use 1 Amp AGC Fast Blow type fuse.

Dimensions.

Front Panel: 19 inches (480 cm) wide, 4.46 inches (11.3 cm) tall.

Front-to-rear dimension: 12.68 inches (32.2 cm), including connectors.

Weight.

22 Lbs.

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